

HIGH YIELD REVIEW POINTS FOR REVISION BY DR ABDUL BASIT ZUBAIR Ear

1. **Conductive hearing loss** shows bone conduction better than air conduction (Rinne negative) and lateralizes to the affected ear in Weber test.
2. **Sensorineural hearing loss** has air conduction better than bone (Rinne positive) but Weber lateralizes to the unaffected ear.
3. **Otosclerosis** is a hereditary condition of abnormal bone remodeling at the stapes footplate, often affecting young women; hearing may paradoxically improve in noisy environments.
4. **Chronic suppurative otitis media (CSOM)** may cause persistent ear discharge and hearing loss; unsafe CSOM may form cholesteatoma leading to erosion of nearby structures.
5. **Cholesteatoma** is an epithelial cyst in the middle ear or mastoid with keratin debris; it can erode ossicles and cause complications like facial palsy or brain abscess.
6. **Glomus tumors** are vascular tumors (paragangliomas) that can cause pulsatile tinnitus and hearing loss; they may invade cranial nerves IX-XII.
7. **Eustachian tube dysfunction** leads to middle ear negative pressure and recurrent otitis media, particularly in children due to anatomical predisposition.
8. **Facial nerve injury** can occur during mastoid or middle ear surgery; the tympanic segment is especially at risk.
9. **Perilymph fistula** presents with sudden sensorineural hearing loss and vertigo after trauma or straining, due to leakage of inner ear fluid.
10. **Tympanometry**: Type A is normal; type B (flat curve) suggests middle ear effusion; type C suggests negative middle ear pressure.

Vertigo, Tinnitus, Otolgia

11. **BPPV** is caused by dislodged otoliths in semicircular canals and is diagnosed by Dix-Hallpike maneuver, which reproduces vertigo and nystagmus.
12. **Ménière's disease** involves endolymphatic hydrops, causing episodes of vertigo, tinnitus, and sensorineural hearing loss, often with ear fullness.
13. **Vestibular neuronitis** is a self-limiting post-viral inflammation of the vestibular nerve causing vertigo without hearing loss.
14. **Tinnitus** may be pulsatile (suggesting vascular cause like AV malformation or glomus tumor) or non-pulsatile (sensorineural origin).
15. **Otitis media** can cause referred otalgia due to shared innervation with the glossopharyngeal and vagus nerves.

16. **Ramsay Hunt syndrome** (herpes zoster oticus) causes painful vesicles on ear and facial palsy; CN VII is affected.
17. **Labyrinthitis** includes both vestibular and cochlear symptoms following infection; it can follow viral URTI.
18. **Superior semicircular canal dehiscence** causes vertigo with loud sounds (Tullio phenomenon); confirmed via CT.
19. **Tinnitus** without hearing loss might require imaging to exclude retrocochlear pathology like acoustic neuroma.
20. **TMJ dysfunction or tonsillitis** can refer pain to the ear, causing otalgia with normal otoscopic findings.

Nose

21. **Nasal polyps** are edematous mucosa, often bilateral and associated with asthma, chronic rhinosinusitis, and aspirin sensitivity (Samter's triad).
22. **Allergic rhinitis** presents with sneezing, nasal congestion, and clear discharge; often with allergic shiners and nasal crease.
23. **Septal hematoma** after nasal trauma must be drained to prevent cartilage necrosis and resultant saddle nose deformity.
24. **Woodruff's plexus** is a venous plexus on the posterior nasal floor; bleeding here is usually profuse and difficult to control.
25. **Hereditary hemorrhagic telangiectasia** causes recurrent epistaxis due to fragile blood vessels; look for mucocutaneous telangiectasias.
26. **Allergic fungal sinusitis** presents with thick allergic mucin and opacified sinuses with hyperdensities on CT.
27. **Rhinosporidiosis** is a chronic infection caused by *Rhinosporidium seeberi*, presenting as a red, friable nasal mass that bleeds on touch.
28. **Unilateral nasal discharge** in a child is a foreign body until proven otherwise, especially if foul-smelling.
29. **Kiesselbach's plexus (Little's area)** is the common site for anterior epistaxis, especially in children and dry climates.
30. **Sphenopalatine artery** is often the culprit in posterior epistaxis and may require endoscopic ligation.

Throat

31. **Peritonsillar abscess** presents with fever, trismus, and uvula deviation away from the affected side; requires drainage.
32. **Retropharyngeal abscess** in children presents with neck stiffness, fever, and dysphagia; may compress the airway.
33. **Laryngomalacia** causes inspiratory stridor in infants due to floppy supraglottic structures; often resolves by 2 years.
34. **Epiglottitis** presents with high fever, drooling, and respiratory distress; "thumb sign" on lateral neck X-ray.
35. **Vocal nodules** occur due to voice abuse; bilateral and symmetric on vocal cords, vs. polyps which are unilateral.
36. **Reinke's edema** is swelling of the vocal cords in smokers, causing husky voice; common in middle-aged women.
37. **Recurrent laryngeal nerve palsy** causes hoarseness and a fixed vocal cord; most often iatrogenic during thyroid surgery.
38. **Arytenoid dislocation** from intubation trauma causes persistent hoarseness and breathy voice.
39. **Laryngeal papillomatosis** is due to HPV types 6 and 11; causes multiple vocal fold growths and hoarseness in children.
40. **Supraglottic cancers** metastasize early due to rich lymphatics; glottic cancers present early due to voice change.

Dysphagia

41. **Zenker's diverticulum** is a pharyngoesophageal pouch leading to dysphagia, regurgitation, and halitosis.
42. **Plummer-Vinson syndrome** occurs in iron deficiency anemia with esophageal webs and glossitis; pre-malignant.
43. **Schatzki ring** causes intermittent dysphagia to solids; associated with hiatal hernia.
44. **Achalasia** causes failure of LES relaxation; barium swallow shows bird-beak appearance.
45. **Cricopharyngeal spasm** presents with intermittent globus sensation; often functional.

Neck

46. **Thyroglossal cyst** moves upward with tongue protrusion; common midline neck mass in children.

47. **Branchial cleft cyst** is a lateral neck mass along anterior border of SCM; arises from incomplete obliteration of branchial clefts.
48. **Reactive cervical lymphadenopathy** is the most common cause of neck mass in children; often secondary to infection.
49. **Virchow's node** in the supraclavicular region may indicate gastric or abdominal malignancy.
50. **Midline neck swellings** in children are usually thyroglossal duct cysts; surgical removal requires Sistrunk procedure.

OPHTHALMOLOGY

1. *Thyroid Eye Disease (Graves' Orbitopathy)*

- **Presentation:** Bilateral proptosis, lid retraction, restrictive extraocular movements (inferior & medial rectus most common), NO fever/redness.
- **Key Feature:** Lid lag, **exophthalmos**, may have optic neuropathy.
- **Diagnosis:** Clinical + **TSI antibodies** (Thyroid Stimulating Immunoglobulin).
- **Management:** Mild → lubricants, steroids; Severe → orbital decompression.

2. *Orbital vs. Preseptal Cellulitis*

| Feature | Orbital Cellulitis | Preseptal Cellulitis |
|---------|--------------------|----------------------|
|---------|--------------------|----------------------|

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|----------------------|--|---------------------------------|
| Location | Post-septal (deep) | Pre-septal (superficial) |
| Proptosis | Yes | No |
| Eye Movements | Restricted & painful | Normal |
| Vision | May be affected | Normal |
| Cause | Sinusitis (most common), trauma | Skin infection (stye, bug bite) |
| Treatment | IV antibiotics (Vancomycin + Ceftriaxone), may need surgery | Oral antibiotics |

3. Dacryocystitis (Lacrimal Sac Infection)

- **Acute:** Painful medial canthal swelling, **pus regurgitation on pressure**.
- **Chronic:** Constant tearing (**epiphora**), recurrent infections.
- **Newborns:** **Nasolacrimal duct obstruction** → **Crigler massage** (90% resolve by 1 year).
- **Treatment:**
 - Acute → **IV antibiotics** (Augmentin).
 - Chronic → **Dacryocystorhinostomy (DCR)**.

4. Eyelid Lesions

| Lesion | Features | Treatment |
|-------------------------|--|-----------------------------|
| Hordeolum (Stye) | Painful, lid margin , staph infection | Warm compresses, drainage |
| Chalazion | Painless, non-marginal , granuloma | Steroid injection, excision |
| Blepharitis | Crusting, itching, chronic | Lid hygiene, erythromycin |

5. Conjunctivitis

| Type | Features | Treatment |
|--------------------------|---|---|
| Bacterial | Purulent discharge, sticky lids | Fluoroquinolones (Ciprofloxacin) |
| Viral (Adeno) | Watery discharge, preauricular LN | Supportive, highly contagious |
| Allergic (Vernal) | Itching, ropy discharge , papillae | Mast cell stabilizers (Opatanol) |

6. Corneal Pathology

- **Herpetic Keratitis: Dendritic ulcer** (fluorescein stain), **photophobia**, treat with **acyclovir**.

- **Pseudomonas Keratitis (Contact Lens Users):** Ring infiltrate, rapid progression → Ciprofloxacin drops.
- **Fungal Keratitis (Farmers):** Feathery margins, trauma with vegetative matter → Natamycin.

7. Uveitis

- **Symptoms:** Pain, photophobia, ciliary congestion, miosis, low IOP.
- **Key Sign:** Keratic precipitates (KPs) + cells in anterior chamber.
- **Treatment:** Steroids (Prednisolone drops) + Cycloplegics (Atropine).

8. Glaucoma

| Type | Features | Treatment |
|---------------|--|---|
| Open-Angle | Painless, gradual vision loss, cupped disc | Prostaglandins (Latanoprost) → β blockers (Timolol) |
| Angle-Closure | Sudden pain, nausea, fixed mid-dilated pupil, high IOP | IV Mannitol → Pilocarpine → Laser iridotomy |

9. Retinal Disorders

- **Diabetic Retinopathy:**
 - NPDR: Microaneurysms, hemorrhages, hard exudates.
 - PDR: Neovascularization → Pan-retinal photocoagulation (PRP).
- **Retinal Vein Occlusion (CRVO):** Flame hemorrhages, venous dilatation → Macular edema → Anti-VEGF (Ranibizumab).
- **Retinal Detachment:** Flashes & floaters → curtain-like vision loss → Urgent surgery.

10. Neuro-Ophthalmology

- **Optic Neuritis:** Pain on eye movement, RAPD (Marcus Gunn pupil), normal fundus initially → MRI (MS risk).

Horner's Syndrome: Ptosis + Miosis + Anhidrosis → Sympathetic chain lesion (Pancoast tumor, carotid dissection).

CN Palsies:

- **CN III (Oculomotor):** Ptosis, down & out eye, pupil involved (aneurysm).
- **CN IV (Trochlear):** Vertical diplopia, head tilt (trauma).

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- **CN VI (Abducens): Cannot abduct** (raised ICP, diabetes).

11. Trauma & Emergencies

- **Chemical Burns: Immediate irrigation (30 mins)**, pH check.
- **Ruptured Globe: Do NOT patch**, shield → **Urgent surgery**.
- **Corneal FB: Remove with needle**, check for rust ring.

12. Pediatric Ophthalmology

- **Congenital Nasolacrimal Duct Obstruction: Crigler massage**, resolves by 1 year.
- **Amblyopia: Occlusion therapy** (patch good eye).
- **Strabismus: Hirschberg test**, esotropia (inward), exotropia (outward).

13. Vitamin A Deficiency

- **Early Sign: Conjunctival xerosis**.
- **Late Signs: Bitot's spots, corneal xerosis → keratomalacia (blindness)**.
- **Treatment: High-dose Vitamin A**.

14. Drug Mechanisms

- **Atropine: Cycloplegic + Mydriatic** (contraindicated in glaucoma).
- **Pilocarpine: Miotic** (opens angle in glaucoma).
- **Latanoprost: ↑ Uveoscleral outflow** (PG analogue).
- **Fluoroquinolones (Ciprofloxacin): Inhibit DNA gyrase**.

Key Mnemonics:

- **CRVO: "Blood & thunder" retina** (hemorrhages).
- **CRAO: Cherry-red spot** (central retinal artery occlusion).
- **Papilledema: Bilateral disc swelling** (ICP↑, headache).

PHARMACOLOGY

✓ Drugs of Choice

Respiratory

- **Acute bronchial asthma** – Salbutamol
- **COPD** – Anticholinergics (Tiotropium, Ipratropium)
- **Aspirin-induced asthma** – Leukotriene inhibitors (Zafirlukast, Montelukast)

Infections

- **MRSA** – Vancomycin
- **VRSA** – Linezolid
- **Amebiasis / Giardiasis / Trichomoniasis / C. difficile** – Metronidazole
- **Syphilis** – Benzathine Penicillin
- **Systemic fungal infection** – Amphotericin-B
- **HSV/Shingles** – Acyclovir
- **Malaria in pregnancy** – Chloroquine

CNS

- **Absence seizure** – Ethosuximide
GTCS – Valproate
Partial seizures – Carbamazepine

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- **Eclampsia** – Magnesium sulfate
- **Status epilepticus** – Lorazepam
- **Anaphylaxis** – Epinephrine

Endocrine/Metabolic

- **DM Type 1** – Insulin
- **DM Type 2** – Metformin
- **DKA** – Crystalline insulin
- **Hyperprolactinemia** – Bromocriptine
- **Hypothyroidism** – Levothyroxine
- **Hyperthyroidism in pregnancy** – Propylthiouracil

CVS

- **AF** – Digoxin
- **SVT** – Adenosine
- **Prinzmetal angina** – Nitroglycerin
- **Pulmonary edema** – Furosemide
- **HTN in pregnancy** – Methyldopa, Labetalol

Others

- **Migraine** – Sumatriptan
- **Gout (acute)** – NSAIDs
- **Cerebral edema** – Mannitol
- **Osteoporosis prevention** – Bisphosphonates
- **Motion sickness** – Scopolamine
- **Traveler's diarrhea** – Diphenoxylate, Norfloxacin

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Antidotes

- **Paracetamol** – N-acetylcysteine
- **Benzodiazepine** – Flumazenil
- **Heparin** – Protamine sulfate
- **Warfarin** – Vitamin K (delayed), FFP (immediate)
- **Opioids** – Naloxone
- **Organophosphates** – Atropine > Pralidoxime
- **Digoxin** – Digoxin Fab
- **Magnesium sulfate** – Calcium gluconate
- **Isoniazid** – Pyridoxine (B6)

Common Drug Side Effects

- **ACE inhibitors** – Cough, angioedema, hyperkalemia
- **Amphotericin B** – Nephrotoxicity
- **Atropine** – Dry mouth, constipation
- **Ciprofloxacin** – Tendon rupture
- **Clozapine** – Agranulocytosis
- **Lithium** – Hypothyroidism, nephrogenic DI
- **INH** – Peripheral neuropathy, hepatitis
- **Vincristine** – Peripheral neuropathy
- **Methotrexate** – Pancytopenia, mucositis
- **Amiodarone** – QT prolongation, hypothyroidism, phototoxicity

Mechanism of Action

- **Aminoglycosides / Tetracyclines** – Inhibit 30S
- **Macrolides / Clindamycin / Chloramphenicol** – Inhibit 50S
- **Vancomycin** – Inhibits peptidoglycan synthesis

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- - **Sulfonamides** – Inhibit folate synthesis
 - **Methotrexate** – Inhibits dihydrofolate reductase
 - **Rifampin** – Inhibits RNA polymerase
 - **INH** – Inhibits mycolic acid synthesis
 - **Fluoroquinolones** – Inhibit DNA gyrase (topoisomerase)
 - **Statins** – HMG CoA reductase inhibitors
 - **Allopurinol** – Xanthine oxidase inhibitor
 - **Theophylline** – PDE inhibitor → ↑cAMP
 - **Steroids** – Inhibit phospholipase A2
 - **Finasteride** – 5α-reductase inhibitor

ANATOMY

Here is a **systematic summary of the high-yield ANATOMY points** from the *NLE Essence* PDF:

Neuroanatomy

- **CSF production:**
 - → 20 mL/hr; total daily production ≈ 450 mL
 - → Formed by **choroid plexus**
- **Sensory Receptors:**
 - **Pacinian corpuscles** – Vibration, deep pressure
 - **Ruffini corpuscles** – Steady pressure, warmth
 - **End bulb of Krause** – Cold

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→ **Muscle spindle** – Stretch reflex →

Golgi tendon organ – Tendon reflex

- **CNS Lesions & Structures:**

→ **Chorea** – Basal ganglia lesion

→ **Intention tremor** – Cerebellum lesion

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→ **Resting tremor** – Substantia nigra (e.g., Parkinson's)

→ **Accommodation center** – Cerebral cortex

→ **Corneal reflex** – Pons

→ **Pupillary light reflex** – Midbrain

→ **Wernicke–Broca connection** – Arcuate fasciculus

- **Hemorrhages on CT Scan:**

→ **Subdural hematoma** – Crescent-shaped

→ **Epidural hematoma** – Biconvex/lens-shaped

→ **Subarachnoid hemorrhage** – Severe headache + blood-tinged CSF

General Anatomy & Bone

- **Most common site of aortic aneurysm** – Infrarenal aorta
- **Rupture of AAA** – Left retroperitoneum is most common • **CT angiography** – Investigation of choice for AAA

- **Exostosis of EAC** (Surfer's ear):

→ Benign bony growth, multiple, bilateral, sessile, due to cold water exposure

→ CT shows broad-based lesion

- **Osteoma:**

→ Unilateral, pedunculated, outer part of EAC

→ Associated with **Gardner syndrome**

Microscopic Anatomy & Cells

Parafollicular cells (C cells) – Secrete calcitonin

Follicular cells of thyroid – Secrete T3 & T4

- **Chief cells of parathyroid** – Secrete PTH
- **Cells most sensitive to hypoxia** – Neurons
- **Fat necrosis** – Common in breast
- **Coagulative necrosis** – Common in heart, liver, kidney (not brain)

Embryology

- **Congenital hydrocele** – Due to patent processus vaginalis
- **Hypertrophic pyloric stenosis** – Congenital hypertrophy of pyloric muscle

High-Yield Pathology Points

1. Cellular Adaptations & Injury

- **Atrophy:** Decreased cell size (e.g., disuse atrophy, denervation).
- **Hypertrophy:** Increased cell size (e.g., LVH in hypertension, uterine hypertrophy in pregnancy).
- **Hyperplasia:** Increased cell number (e.g., endometrial hyperplasia, BPH).
- **Metaplasia:** Replacement of one cell type with another (e.g., Barrett's esophagus, squamous metaplasia in smokers).
- **Dysplasia:** Disordered growth (pre-malignant).
- **Necrosis vs. Apoptosis:**
 - **Necrosis:** Inflammatory, pathological (coagulative, liquefactive, caseous, fat, gangrenous).
 - **Apoptosis:** Programmed, non-inflammatory (e.g., embryogenesis, viral hepatitis).

2. Inflammation & Repair

- **Acute Inflammation:**

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□ **Cardinal signs:** Redness, swelling, heat, pain, loss of function.

□ **Mediators:** Histamine (immediate), prostaglandins (pain/fever), bradykinin (pain).

Cells: Neutrophils (first responders).

- **Chronic Inflammation:**

□ **Cells:** Macrophages, lymphocytes, plasma cells.

□ **Granuloma:** Caseating (TB) vs. non-caseating (sarcoidosis).

- **Healing:**

□ **Primary intention:** Clean surgical wounds.

□ **Secondary intention:** Large wounds with granulation tissue.

3. Hemodynamic Disorders

- **Edema:**

□ **Causes:** ↑ Hydrostatic pressure (CHF), ↓ Oncotic pressure (nephrotic syndrome).

- **Thrombosis: Virchow's triad** (stasis, hypercoagulability, endothelial injury).

- **Embolism:**

□ **DVT → PE** (most common).

□ **Fat embolism** (long bone fractures).

□ **Amniotic fluid embolism** (DIC, hypoxia during labor).

- **Infarction:**

□ **Pale** (arterial occlusion, e.g., MI).

□ **Hemorrhagic** (venous occlusion, e.g., testicular torsion).

4. Immunopathology

- **Hypersensitivity Reactions:**

□ **Type I (IgE):** Anaphylaxis, asthma.

□ **Type II (IgG/IgM):** Autoimmune hemolytic anemia, Goodpasture's.

□ **Type III (Immune complex):** SLE, post-streptococcal GN. □ **Type IV (T-cell):** TB, contact dermatitis.

- **Autoimmune Diseases:**

□ **SLE:** Anti-dsDNA, anti-Smith.

□ **Rheumatoid arthritis:** RF, anti-CCP.

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- **Amyloidosis:** Congo red (+) with apple-green birefringence.

5. *Neoplasia*

Benign vs. Malignant:

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Benign: Well-differentiated, no metastasis.

□ **Malignant:** Poorly differentiated, invades/metastasizes.

- **Carcinogenesis:**

- **Oncogenes:** RAS, MYC, HER2/neu.

- **Tumor suppressors:** p53, Rb, BRCA1/2.

- **Paraneoplastic Syndromes:**

- **SIADH** (small cell lung cancer).

- **Cushing's** (ACTH-secreting tumors).

- **Hypercalcemia** (PTHrp in squamous cell carcinoma).

6. Genetic Disorders

- **Autosomal Dominant:** Huntington's, Marfan's, NF1.
- **Autosomal Recessive:** Cystic fibrosis, sickle cell, PKU.
- **X-linked:** Duchenne MD, hemophilia A/B.
- **Triplet Repeat Disorders:** Fragile X (CGG), Huntington's (CAG).

7. Nutritional & Environmental Pathology

- **Vitamin Deficiencies:**

- **B1 (Thiamine):** Beriberi, Wernicke-Korsakoff.

- **B3 (Niacin):** Pellagra (3 D's: Dermatitis, Diarrhea, Dementia).

- **B12/Folate:** Megaloblastic anemia, neurologic symptoms (B12 only).

- **Vitamin C:** Scurvy (gingival bleeding, poor wound healing).

- **Toxins:**

- **CO poisoning:** Cherry-red skin, ↑ COHb.

- **Lead poisoning:** Basophilic stippling, wrist/foot drop.

8. Infectious Disease Pathology

- **Bacteria:**

- **Staph aureus:** Abscesses, endocarditis (IV drug users).

- **Strep pyogenes:** Rheumatic fever (M protein), post-streptococcal GN.

- **Viruses:**

- **HPV:** Koilocytes, cervical cancer (types 16/18).

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□ **EBV:** Mononucleosis (atypical lymphocytes), Burkitt's lymphoma. **Fungi:**

□ **Candida:** Pseudohyphae, thrush (immunocompromised). □

□ **Aspergillus:** Angioinvasive (neutropenic patients).

9. Hematopathology

- **Anemias:**

- **Microcytic:** Fe deficiency (↓ ferritin), thalassemia (↑ HbA2).

- **Macrocytic:** B12/folate deficiency (hypersegmented neutrophils). □

- **Hemolytic:** G6PD deficiency (Heinz bodies, bite cells).

- **Leukemia/Lymphoma:**

- **AML:** Auer rods, myeloperoxidase (+).

- **CLL:** Smudge cells, CD5/CD19 (+).

- **Hodgkin lymphoma:** Reed-Sternberg cells (CD15/CD30 +).

10. Systemic Pathology Highlights

- **Cardiac:**

- **Atherosclerosis:** LDL → foam cells → fibrous plaque → rupture.

- **MI complications:** Papillary muscle rupture (MR), ventricular aneurysm.

- **Pulmonary:**

- **Emphysema:** α1-antitrypsin deficiency (panacinar).

- **ARDS:** Diffuse alveolar damage, hyaline membranes.

- **Renal:**

- **Nephritic syndrome:** HTN, hematuria (post-streptococcal GN).

- **Nephrotic syndrome:** Proteinuria, hypoalbuminemia (minimal change disease).

- **Liver:**

- **Cirrhosis:** Bridging fibrosis, portal HTN.

- **Hepatitis:**

- **Acute:** Councilman bodies (apoptosis).

- **Chronic:** Ground-glass hepatocytes (HBV).

Key Mnemonics

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- **Granulomatous diseases:** TB, Sarcoidosis, Crohn's, Fungal, Beryllium (TSCFB).
Tumor markers:
CA-125 (ovary), PSA (prostate), CEA (colon).
- **Hypersensitivity reactions:** ACID (Type I – Anaphylactic, Type II – Cytotoxic, Type III – Immune complex, Type IV – Delayed).

High-Yield Notes from Anatomy Shelf Notes

1. Lumbar Puncture & Epidural Anesthesia

- **Entry Point:** Between L3/L4 or L4/L5 (level of iliac crests).
- **Structures Pierced:** Skin → Fascia → Ligamentum flavum → Epidural space → Dura mater → Subarachnoid space (CSF).
- **Spinal Cord Ends:**
 - Adults: L1/L2.
 - Children: L3.
- **Dural Sac Ends:** S2.
- **Complication:** Herniation if intracranial pressure is elevated.

2. Herniated IV Disc

- **Common Sites:** L4/L5 or L5/S1 (lumbar); C5/C6 or C6/C7 (cervical).
- **Affected Nerve Root:** Traversing root (e.g., L4/L5 herniation compresses L5).
- **Mechanism:** Nucleus pulposus herniates through annulus fibrosus, compressing spinal nerve.

3. Spinal Curvature Abnormalities

- **Kyphosis:** Exaggerated thoracic curve (osteoporosis in elderly).
- **Lordosis:** Exaggerated lumbar curve (pregnancy, spondylolisthesis).
- **Scoliosis:** Lateral deviation (leg-length discrepancy, poliomyelitis).

4. Upper Limb Fractures



- **Humerus Fractures:**

- **Surgical Neck:** Axillary nerve injury.
- **Midshaft:** Radial nerve injury.

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- **Medial Epicondyle:** Ulnar nerve injury.
- **Colles' Fracture:** Distal radius fracture with **dorsal displacement** ("dinner fork deformity").
- **Scaphoid Fracture:**
 - **Tenderness in anatomical snuffbox.**
 - Risk of **avascular necrosis** (proximal fragment).

5. Rotator Cuff Muscles (SITS)

- **Supraspinatus, Infraspinatus, Teres minor, Subscapularis.**
- **Function:** Stabilize shoulder joint; **supraspinatus initiates abduction (0°–15°).**

6. Carpal Tunnel Syndrome

- **Cause:** Compression of **median nerve** in carpal tunnel.
- **Symptoms:**
 - Numbness in **lateral 3.5 fingers** (saves palm).
 - **Ape hand deformity** (loss of opposition).

7. Brachial Plexus Injuries

- **Erb-Duchenne Palsy (C5–C6):**
 - "Waiter's tip" posture (adducted shoulder, medially rotated arm).
- **Klumpke Palsy (C8–T1):**
 - **Claw hand** (ulnar nerve) + **ape hand** (median nerve).

8. Lower Limb Injuries

- **Femoral Neck Fracture:** Risk of **avascular necrosis** (disrupted retinacular arteries).
- **Unhappy Triad (Knee):**
 - Tibial collateral ligament + Medial meniscus + Anterior cruciate ligament (ACL).
- **Ankle Sprain:** **Inversion injury** damages **anterior talofibular ligament.**

9. Abdominal Hernias

- **Indirect Inguinal Hernia:** ○ Congenital; passes **lateral** to inferior epigastric vessels.
- **Direct Inguinal Hernia:**
 - Acquired; passes **medial** to inferior epigastric vessels (Hesselbach's triangle).

10. Gastrointestinal Anatomy

- **Foregut/Midgut/Hindgut:**
 - **Foregut:** Supplied by **celiac artery** (T5–T9); pain referred to **epigastrium**.
 - **Midgut:** Supplied by **SMA** (T10–T11); pain referred to **umbilicus**.
 - **Hindgut:** Supplied by **IMA** (L1–L2); pain referred to **hypogastrium**.
- **Appendicitis:**
 - Early pain at **umbilicus** (visceral); later shifts to **McBurney's point** (parietal).

11. Portal Hypertension

- **Portacaval Anastomoses:**
 - **Esophageal varices** (left gastric vein + azygos vein).
 - **Caput medusae** (paraumbilical veins + epigastric veins).
 - **Hemorrhoids** (superior rectal vein + inferior rectal vein).

12. Cranial Nerves

- **Facial Nerve (CN VII):**
 - **Bell's Palsy:** Ipsilateral facial paralysis, dry eye, loss of taste (anterior 2/3 tongue).
- **Oculomotor Nerve (CN III):**
 - **Palsy:** Ptosis, "down and out" eye, dilated pupil.
- **Horner Syndrome:**
 - **Miosis, ptosis, anhidrosis** (disrupted sympathetic pathway).

13. Thyroid & Parathyroid

- **Thyroid:**
 - **Superior laryngeal nerve (external branch)** at risk during thyroidectomy.

- **Recurrent laryngeal nerve** injury → hoarseness.
- **Parathyroid:**
 - **PTH** increases blood calcium; **calcitonin** decreases it.

14. Larynx

- **Vocal Cord Innervation:**
 - **Recurrent laryngeal nerve** (all muscles except cricothyroid).
 - **Cricothyroid muscle** (external laryngeal nerve).

15. Emergency Procedures

- **Cricothyrotomy:** Incision through **cricothyroid membrane** for airway obstruction.

Key Mnemonics

- **Rotator Cuff: SITS** (Supraspinatus, Infraspinatus, Teres minor, Subscapularis).
- **Foregut/Midgut/Hindgut: CA** (celiac), **SMA**, **IMA**.
- **Brachial Plexus Roots: "Randy Travis Drinks Cold Beer"** (Roots, Trunks, Divisions, Cords, Branches).

High-Yield Revision Points *Gynae and Obs*

1. *Pregnancy & Labour*

- **Terminology:**
 - **Term pregnancy:** 37–42 weeks
 - **Preterm labour:** <37 weeks □ **Post-term pregnancy:** >42 weeks
- **Stages of labour:**
 - **1st stage:** Cervical dilation (latent & active phases)
 - **2nd stage:** Full dilation to delivery

- **3rd stage:** Placental delivery (expectant vs. active management)
- **Induction of labour:**
 - **Indications:** Post-term, preeclampsia, IUGR
 - **Methods:** Prostaglandins (PGE2), oxytocin, ARM

2. Medical Disorders in Pregnancy

- **Hypertensive disorders:**
 - **Gestational HTN:** New HTN after 20 weeks, no proteinuria
 - **Preeclampsia:** HTN + proteinuria/organ dysfunction
 - **Eclampsia:** Preeclampsia + seizures (treat with **MgSO₄**) □
 - **HELLP syndrome:** Hemolysis, elevated LFTs, low platelets
- **Diabetes in pregnancy:**
 - **GDM:** Screen at 24–28 weeks (OGTT)
 - **Management:** Diet → insulin (oral agents avoided)
- **Thromboembolism:**
 - **LMWH** is anticoagulant of choice

3. Malpresentation & Multiple Pregnancy

- **Breech presentation:**
 - **Types:** Frank, complete, footling
 - **Management:** ECV at 37 weeks → C-section if unsuccessful
- **Transverse lie:**
 - **Risk factors:** Multiparity, polyhydramnios
 - **Delivery:** C-section (vaginal delivery contraindicated)
- **Twin pregnancy:**
 - **Dichorionic diamniotic (DCDA):** Lowest risk
 - **Monochorionic monoamniotic (MCMA):** Highest risk (cord entanglement)
 - **Delivery:** Vaginal if Twin A cephalic, C-section if complications

4. Liquor Volume Abnormalities

- **Polyhydramnios (AFI >24 cm):**
 - **Causes:** GDM, fetal anomalies (e.g., duodenal atresia)
- **Oligohydramnios (AFI <5 cm):**

- **Causes:** PPROM, IUGR, renal anomalies
- **Management:** Amnioinfusion if severe

5. Obstetric Emergencies

- **Placental abruption:**
 - **Classic triad:** Painful bleeding, uterine tenderness, fetal distress
 - **Management:** Emergency delivery
- **Uterine rupture:**
 - **Risk factors:** Previous C-section, uterine surgery
 - **Signs:** Sudden pain, fetal distress, loss of contractions
- **Shoulder dystocia:**
 - **McRoberts maneuver** (first-line)
 - **Complication:** Erb's palsy

Gynecology Topics

6. Puberty

- **Normal puberty:**
 - **Thelarche (breast buds) → Pubarche → Menarche**
 - **Delayed puberty:** No breast development by **13** or no menarche by **15**
- **Primary amenorrhea:**
 - **Turner syndrome (45X):** Streak ovaries, high FSH
 - **Imperforate hymen:** Cyclical pain, bulging membrane

7. Infertility

- **Causes:**
 - **Male factor:** Low sperm count/motility
 - **Female factor:** PCOS, tubal blockage, endometriosis
- **Investigations:**
 - **Day 3 FSH/LH, HSG, semen analysis**
- **Treatment:**
 - **Clomiphene (ovulation induction) → IUI → IVF**

8. Contraception

- **Combined hormonal (COCP):**
 - **Contraindications:** HTN, smokers >35, history of VTE
- **Progesterone-only (POP):**
 - **Safe in breastfeeding, VTE risk**
- **LARC (Long-acting reversible):**
 - **Copper IUD:** Emergency contraception
 - **Levonorgestrel IUS (Mirena):** Treats heavy bleeding

9. Menstrual Disorders

- **Heavy menstrual bleeding (HMB):**
 - **Causes:** Fibroids, adenomyosis, coagulopathy (e.g., von Willebrand)
 - **Treatment:** Tranexamic acid, hormonal IUD, endometrial ablation
- **Dysmenorrhea:**
 - **Primary:** No pathology (treat with NSAIDs)
 - **Secondary:** Endometriosis, PID

10. Sexual Disorders

- **Dyspareunia (painful sex):**
 - **Superficial:** Vaginismus, vulvodynia
 - **Deep:** Endometriosis, PID

Hypoactive sexual desire disorder:

- **Postpartum:** Low estrogen (breastfeeding)

11. Urinary Problems

- **Stress incontinence:**
 - **Pelvic floor exercises (1st line) → Midurethral sling**
- **Overactive bladder:**
 - **Anticholinergics (oxybutynin), mirabegron**

12. Uterovaginal Prolapse

- **Grades:**
 - **1st:** Descent to introitus
 - **2nd:** Protrudes outside □
 - 3rd/4th:** Complete procidentia
- **Management:**
 - **Pessary (1st line in elderly) → Surgery (hysterectomy + repair)**

13. Genital Tract Infections

- **Bacterial vaginosis:**
 - Clue cells, fishy odor → Metronidazole
- **Candidiasis:**
 - Itching, cottage cheese discharge → Fluconazole
- **PID:**
 - Cervical motion tenderness → Ceftriaxone + Doxycycline

14. Gynecological Tumors

- **Endometrial cancer:**
 - Postmenopausal bleeding → Hysterectomy
- **Ovarian cancer:**
 - Silent tumor → CA-125, ultrasound
 - Risk factors: BRCA, Lynch syndrome

Key Mnemonics

- **HELLP syndrome:** Hemolysis, Elevated LFTs, Low Platelets
- **PID treatment:** CDC (Ceftriaxone, Doxycycline, Cover anaerobes with metronidazole if abscess)
- **Polyhydramnios causes:** Diabetes, Duodenal atresia, Down syndrome

Internal Medicine

Endocrinology

1. Pituitary Gland

- **Anterior Pituitary (Adenohypophysis):**
 - **Prolactinoma:** Most common functional pituitary adenoma → **galactorrhea, amenorrhea, infertility** (treated with **dopamine agonists** like **bromocriptine/cabergoline**).
 - **Growth Hormone (GH) Excess:**
 - ✦ **Before epiphyseal closure:** Gigantism.
 - ✦ **After closure:** Acromegaly (enlarged hands/feet, coarse facial features, macroglossia, carpal tunnel syndrome).
 - ✦ **Diagnosis:** Elevated **IGF-1**, **failure to suppress GH on oral glucose tolerance test (OGTT)**.
 - **Cushing's Disease:** ACTH-secreting adenoma → **high cortisol** (diagnose with **dexamethasone suppression test**).
 - **Sheehan's Syndrome:** Postpartum pituitary necrosis (hypotension + failure to lactate + amenorrhea).
- **Posterior Pituitary (Neurohypophysis):**
 - **Diabetes Insipidus (DI):**
 - ✦ **Central DI:** ADH deficiency (head trauma, tumors) → **low urine osmolality, high serum osmolality** (treat with **desmopressin (dDAVP)**).
 - ✦ **Nephrogenic DI:** ADH resistance (lithium, hypercalcemia) → **no response to dDAVP** (treat with **thiazides + low-salt diet**).
 - **SIADH:** High ADH → **hyponatremia, high urine osmolality, low serum osmolality** (treat with fluid restriction, demeclocycline).

2. Thyroid Disorders

- **Hyperthyroidism:**
 - **Graves' Disease:** TSI antibodies → **diffuse goiter, exophthalmos, pretibial myxedema** (treat with **methimazole/propylthiouracil (PTU)** or **radioactive iodine**).
 - **Thyroid Storm:** Tachycardia, fever, agitation (treat with **PTU (blocks synthesis + conversion)**, **beta-blockers**, **steroids**, **iodine**).
 - **Toxic Multinodular Goiter:** Hot nodules on scan (no autoantibodies).
- **Hypothyroidism:**

- Hashimoto's Thyroiditis: Anti-TPO antibodies → goiter, weight gain, bradycardia, myxedema coma (treat with levothyroxine).
- Myxedema Coma: Hypothermia, bradycardia, coma (treat with IV levothyroxine + steroids).
- **Thyroid Nodules/Cancer:**
 - **Most common type: Papillary carcinoma** (Psammoma bodies, lymphatic spread).
 - **Medullary carcinoma: Calcitonin secretion**, associated with **MEN 2A/2B** (RET proto-oncogene).
 - **Anaplastic carcinoma: Aggressive, poor prognosis.**

3. Adrenal Gland

- **Cushing's Syndrome:**
 - **Causes:** Pituitary adenoma (**Cushing's disease**), adrenal adenoma, ectopic ACTH (small cell lung cancer), exogenous steroids.
 - **Findings: Moon facies, buffalo hump, striae, hyperglycemia, osteoporosis.**
 - **Diagnosis: High-dose dexamethasone suppression test** (suppresses if pituitary source).
- **Primary Hyperaldosteronism (Conn's Syndrome):**
 - **Hypokalemia, metabolic alkalosis, hypertension** (low renin, high aldosterone).
 - **Diagnosis: Elevated aldosterone/renin ratio** (treat with **spironolactone**).
- **Addison's Disease (Primary Adrenal Insufficiency):**
 - **Causes: Autoimmune (most common), TB, metastatic disease.**
 - **Findings: Fatigue, hyperpigmentation, hyponatremia, hyperkalemia, hypoglycemia.**
 - **Diagnosis: Low cortisol, high ACTH** (treat with **glucocorticoids + mineralocorticoids**).
- **Pheochromocytoma:**
 - **Rule of 10s:** 10% bilateral, 10% malignant, 10% extra-adrenal.
 - **Findings: Episodic hypertension, headache, sweating, palpitations.**
 - **Diagnosis: 24-hour urine metanephrines** (treat with **alpha-blockers first** (phenoxybenzamine), then **beta-blockers**).

4. Diabetes Mellitus (DM)

- **Type 1 DM: Autoimmune (anti-GAD antibodies)**, absolute insulin deficiency, **DKA risk**.
- **Type 2 DM: Insulin resistance**, associated with **metabolic syndrome (obesity, HTN, dyslipidemia)**.

- **Complications:**
 - **Microvascular:** Retinopathy, nephropathy (Kimmelstiel-Wilkin nodules), neuropathy.
 - **Macrovascular:** CAD, stroke, PVD.
 - **DKA:** High anion gap metabolic acidosis, ketones, Kussmaul breathing (treat with IV fluids, insulin, potassium).
 - **HHS:** Hyperosmolar state without significant ketosis (higher mortality than DKA).

5. Calcium & Bone Disorders

- **Hyperparathyroidism:**
 - **Primary:** High PTH, high calcium (adenoma) → osteitis fibrosa cystica, nephrolithiasis.
 - **Secondary:** High PTH, low calcium (chronic kidney disease).
- **Hypoparathyroidism:** Low PTH, low calcium (post-thyroidectomy) → Chvostek's & Trousseau's signs.
- **Hypercalcemia of Malignancy:** PTHrP secretion (squamous cell lung cancer, breast cancer).
- **Osteoporosis:** DEXA scan (T-score ≤ -2.5), treat with bisphosphonates.

6. Reproductive Endocrinology

- **PCOS:** Oligomenorrhea, hirsutism, insulin resistance, LH:FSH $> 2:1$.
- **Klinefelter's (47,XXY):** Tall, gynecomastia, small testes, infertility.
- **Turner's (45,X):** Short stature, webbed neck, coarctation of aorta, primary amenorrhea.

7. Miscellaneous

- **MEN Syndromes:**
 - **MEN 1 (3 P's):** Pituitary, Pancreatic (gastrinoma), Parathyroid.
 - **MEN 2A:** Medullary thyroid cancer, Pheochromocytoma, Hyperparathyroidism.
 - **MEN 2B:** Medullary thyroid cancer, Pheochromocytoma, Marfanoid habitus, mucosal neuromas.

Key Labs & Diagnostic Tests

- **ACTH Stimulation Test:** Diagnoses adrenal insufficiency.
- **Water Deprivation Test:** Differentiates DI vs. psychogenic polydipsia.
- **Dexamethasone Suppression Test:** Diagnoses Cushing's.

Gastroenterology

1. Esophagus

- **GERD:**
 - **Symptoms:** Heartburn, regurgitation, chronic cough, hoarseness.
 - **Complications:** **Barrett's esophagus** (intestinal metaplasia → adenocarcinoma), **strictures**.
 - **Diagnosis:** **Endoscopy** (gold standard), **pH monitoring**. ○ **Treatment:** **PPIs** (1st-line), **H2 blockers**, lifestyle changes (avoid fatty foods, caffeine, alcohol).
- **Achalasia:**
 - **Pathology:** **Loss of myenteric (Auerbach's) plexus** → **failure of LES relaxation**.
 - **Symptoms:** **Dysphagia** (solids > liquids), **regurgitation of undigested food**, **bird's beak** on barium swallow.
 - **Diagnosis:** **Esophageal manometry** (gold standard).
 - **Treatment:** **Pneumatic dilation**, **Heller myotomy**, **Botox injection**.
- **Boerhaave Syndrome:**
 - **Full-thickness esophageal rupture** (after vomiting) → **mediastinitis**, **subcutaneous emphysema**, **Hamman's crunch**.
 - **Treatment:** **Emergency surgery + antibiotics**.

2. Stomach & Peptic Ulcer Disease (PUD)

- **PUD Causes:**
 - **H. pylori** (most common, **urea breath test** for diagnosis). ○ **NSAIDs** (COX-1 inhibition → ↓PGE2 → ↓mucosal protection). ○ **Zollinger-Ellison Syndrome** (gastrinoma → high acid secretion → multiple ulcers).
- **Complications:**
 - **Bleeding** (most common).
 - **Perforation:** **Sudden severe abdominal pain**, **rigid abdomen**, **free air under diaphragm** on X-ray.
 - **Gastric Outlet Obstruction:** **Non-bilious vomiting**, **succussion splash**.

- **Treatment:**
 - **H. pylori:** PPI + clarithromycin + amoxicillin/metronidazole (triple therapy).
 - **NSAID-induced:** Stop NSAIDs + PPI.

3. Liver Disease

- **Cirrhosis & Portal Hypertension:**
 - **Causes:** Alcohol, hepatitis B/C, NASH.
 - **Complications:**
 - ✦ **Esophageal varices** (treat acute bleed with **octreotide** + band ligation).
 - ✦ **Ascites** (diagnose with **SAAG >1.1**, treat with **spironolactone** + furosemide).
 - ✦ **Hepatic encephalopathy** (↑ ammonia, treat with **lactulose** + rifaximin).
 - ✦ **Hepatorenal syndrome** (oliguria, ↑ Cr, treat with **midodrine** + octreotide).
- **Hepatitis:**
 - **Hep B:** HBsAg (active infection), Anti-HBc (exposure), Anti-HBs (immunity).
 - **Hep C:** Most common cause of chronic hepatitis → cirrhosis/HCC (treat with direct-acting antivirals).
- **Liver Tumors:**
 - **Hepatocellular Carcinoma (HCC):** ↑ AFP, associated with cirrhosis, hepatitis B/C.
 - **Metastases:** Most common liver tumor (colon, breast, lung primaries).

4. Biliary & Pancreatic Disease

- **Gallstones:**
 - **Cholelithiasis:** Asymptomatic.
 - **Cholecystitis:** RUQ pain, Murphy's sign, fever (treat with **cholecystectomy**).
 - **Choledocholithiasis:** Jaundice, ↑ ALP, ↑ bilirubin (diagnose with **MRCP**, treat with **ERCP**).
- **Acute Pancreatitis:**
 - **Causes:** GET SMASHED (Gallstones, Ethanol, Trauma, Steroids, Mumps, Autoimmune, Scorpion sting, Hyperlipidemia, ERCP, Drugs).
 - **Diagnosis:** ↑ Lipase (more specific than amylase), CT findings.
 - **Complications:** Pseudocyst (4 weeks later), necrotizing pancreatitis.
- **Chronic Pancreatitis:**

- Causes: Alcohol most common.
- Findings: Steatorrhea (fat malabsorption), calcifications on X-ray, DM (loss of islets).

5. Inflammatory Bowel Disease (IBD)

- Crohn's Disease:
 - Transmural inflammation, skip lesions, cobblestone mucosa, fistulas, non-caseating granulomas.
 - Extraintestinal: Erythema nodosum, uveitis, ankylosing spondylitis (HLA-B27).
 - Treatment: Steroids, anti-TNF (infliximab), surgery (no cure).
- Ulcerative Colitis:
 - Limited to colon, continuous inflammation, crypt abscesses, no granulomas.
 - Extraintestinal: Primary sclerosing cholangitis (PSC), pyoderma gangrenosum.
 - Toxic Megacolon: Medical emergency (abdominal distension, fever, tachycardia).
 - Treatment: 5-ASA (mesalamine), colectomy (curative).

6. Colon & Small Bowel Disorders

- Diverticulosis:
 - Asymptomatic outpouchings, risk ↑ with age.
 - Diverticulitis: LLQ pain, fever, leukocytosis (treat with antibiotics).
- Celiac Disease:
 - Autoimmune (anti-tTG, anti-endomysial antibodies), villous atrophy, diarrhea, bloating.
 - Treatment: Gluten-free diet.
- Colorectal Cancer:
 - Most common site: Rectosigmoid.
 - Screening: Colonoscopy at 45+ (earlier if familial polyposis, Lynch syndrome).

7. GI Bleeding

- Upper GI Bleed (UGIB):
 - Causes: PUD, varices, Mallory-Weiss tear.
 - Diagnosis: EGD.
- Lower GI Bleed (LGIB):

- Causes: Diverticulosis (most common), angiodysplasia, hemorrhoids.
- Diagnosis: Colonoscopy.

8. Miscellaneous High-Yield Facts

- Appendicitis: RLQ pain, McBurney's tenderness, ↑WBC, Rovsing's sign.
- Hereditary Hemochromatosis: ↑Fe, ↑ferritin, ↑TSAT, cirrhosis, DM, cardiomyopathy.
- Wilson's Disease: ↓Ceruloplasmin, Kayser-Fleischer rings, neuropsych symptoms.

Key Labs & Imaging

- AST/ALT Ratio: >2 in alcoholic hepatitis.
- Ammonia: ↑ in hepatic encephalopathy.
- Barium Swallow: Bird's beak (achalasia), corkscrew (esophageal spasm).

Neurology

1. Stroke & Cerebrovascular Disease

- Ischemic Stroke (80%):
 - Thrombotic: Atherosclerosis (MCA most common).
 - Embolic: Atrial fibrillation (cardioembolic), **MCA territory** most affected.
 - Lacunar Strokes: Small vessel disease (hypertension, diabetes) → **pure motor (internal capsule), pure sensory (thalamus), ataxic hemiparesis (pons)**.
 - Diagnosis: **Non-contrast CT first** (rule out hemorrhage), **MRI diffusionweighted imaging (DWI) gold standard**.
 - Treatment: **tPA within 4.5 hrs** (exclude hemorrhage, recent surgery, anticoagulation).
- Hemorrhagic Stroke (20%):

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Hypertensive hemorrhage: Basal ganglia, thalamus, pons, cerebellum.

- **Subarachnoid Hemorrhage (SAH):** Thunderclap headache, nuchal rigidity, Fisher Grade 3 = highest vasospasm risk.
 - ✦ **Cause:** Berry aneurysm (most commonly at anterior communicating artery).
 - ✦ **Diagnosis:** CT → LP if negative (xanthochromia).
 - ✦ **Treatment:** Nimodipine (prevents vasospasm), surgical clipping/coiling.
- **Transient Ischemic Attack (TIA):**
 - **Neurologic deficits resolving <24 hrs** (usually <1 hr).
 - **ABCD2 score** predicts stroke risk.

2. Seizures & Epilepsy

- **Focal Seizures:**
 - **With impaired awareness (complex partial):** Temporal lobe (olfactory/psychic auras, automatisms).
 - **Without impaired awareness:** Motor (Jacksonian march) or sensory symptoms.
- **Generalized Seizures:**
 - **Tonic-clonic (grand mal):** Postictal confusion, tongue biting.
 - **Absence (petit mal):** 3 Hz spike-and-wave EEG, no postictal state.
 - **Atonic:** Sudden loss of tone ("drop attacks").
 - **Myoclonic:** Sudden jerks (e.g., Juvenile Myoclonic Epilepsy).
- **Status Epilepticus:** >5 mins of seizure or recurrent without recovery → IV lorazepam, then fosphenytoin.
- **First-line drugs:**
 - **Focal:** Levetiracetam, carbamazepine.
 - **Generalized:** Valproate (avoid in pregnancy → neural tube defects).

3. Headache

- **Migraine:**
 - **With aura** (scintillating scotoma, paresthesias), **photophobia**, **phonophobia**.
Treatment: Triptans (contraindicated in CAD, stroke), propranolol/topiramate for prophylaxis.
- **Cluster Headache:**

- - Unilateral, periorbital, Horner's syndrome (ptosis, miosis).
 - Treatment: High-flow O₂, sumatriptan.
- Trigeminal Neuralgia:
 - Unilateral stabbing pain (V2/V3 distribution) → carbamazepine.
- Idiopathic Intracranial Hypertension (Pseudotumor cerebri):
 - Obese women, papilledema, headache, visual loss.
 - Treatment: Acetazolamide, LP, weight loss.

4. Neurodegenerative Disorders

- Alzheimer's Disease:
 - Memory loss (early short-term), apraxia, aphasia. ○ Pathology: Amyloid plaques (A β), neurofibrillary tangles (tau).
 - Treatment: AChE inhibitors (donepezil), memantine (NMDA antagonist).
- Parkinson's Disease:
 - TRAP: Tremor (pill-rolling), Rigidity (cogwheel), Akinesia/bradykinesia, Postural instability.
 - Pathology: Lewy bodies (α -synuclein), substantia nigra degeneration.
 - Treatment: Levodopa/carbidopa (gold standard), dopamine agonists (pramipexole).
- ALS (Lou Gehrig's Disease):
 - UMN + LMN signs (spasticity + atrophy, no sensory loss).
 - No cure (riluzole modestly prolongs survival).

5. Demyelinating Diseases

- Multiple Sclerosis (MS):
 - Relapsing-remitting (most common), optic neuritis, internuclear ophthalmoplegia (INO), Lhermitte's sign.
 - Diagnosis: MRI (periventricular plaques), CSF oligoclonal bands.
 - Treatment: Steroids (acute), interferon- β /glatiramer (prevention).
- Guillain-Barré Syndrome:
 - Ascending paralysis, areflexia, albuminocytologic dissociation (\uparrow CSF protein, normal WBC).
 - Treatment: IVIG or plasmapheresis.

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6. CNS Infections

- **Meningitis:**
 - **Bacterial** (*S. pneumoniae*, *N. meningitidis*): Neck stiffness, fever, Kernig's/Brudzinski's signs → empiric ceftriaxone + vancomycin + dexamethasone.
 - **Viral** (enterovirus): Lymphocytic CSF, self-limiting.
- **Encephalitis:** ○ **HSV-1:** Temporal lobe necrosis (MRI), acyclovir treatment.
- **Brain Abscess:**
 - Ring-enhancing lesion, Streptococci/Staphylococci → surgical drainage + antibiotics.

7. Spinal Cord & Peripheral Nerve

- **Spinal Cord Compression:**
 - **Emergency:** Back pain, weakness, sensory level, bowel/bladder dysfunction.
 - **Causes:** Metastasis (most common), epidural abscess.
- **Brown-Séquard Syndrome:**
 - **Hemisection:** Ipsilateral weakness + loss of vibration/proprioception, contralateral loss of pain/temp.
- **Peripheral Neuropathy:**
 - **Diabetes:** Glove-and-stocking distribution. ○ **B12 Deficiency:** Subacute combined degeneration (posterior + lateral columns).

8. High-Yield Syndromes

- **Horner's Syndrome:** Ptosis, miosis, anhidrosis (Pancoast tumor, carotid dissection).

- **Wernicke-Korsakoff:** Confusion, ataxia, nystagmus (Wernicke) + confabulation (Korsakoff) → thiamine deficiency.
- **Syringomyelia:** Bilateral loss of pain/temp in "cape-like" distribution (central cord lesion).

Key Reflexes & Localization

- **Babinski Sign:** UMN lesion (toes dorsiflex).
- **LMN Lesion:** Hyporeflexia, atrophy, fasciculations.
- **UMN Lesion:** Hyperreflexia, spasticity, clasp-knife rigidity.

Must-Know Drugs & Toxins

- **Warfarin Toxicity:** Vitamin K + FFP.
- **Opioid Overdose:** Pinpoint pupils, naloxone reversal.
- **Anticholinergic Toxicity:** Hot as a hare, dry as a bone, red as a beet, mad as a hatter.

Cardiology

1. Coronary Artery Disease (CAD) & Acute Coronary Syndrome (ACS)

- **Stable Angina:**
 - **Symptoms:** Chest pain (**crushing, substernal**) radiating to **left arm/jaw**, relieved by rest/nitroglycerin.
 - **Diagnosis:** Stress test (exercise ECG), coronary angiography (gold standard).
 - **Treatment:** Nitrates, beta-blockers (1st-line), CCBs (if beta-blockers contraindicated).
- **Unstable Angina/NSTEMI:**
 - **Symptoms:** Angina at rest, **↑Troponin (NSTEMI)**, normal ST on ECG.
 - **Treatment:** Aspirin + P2Y₁₂ inhibitor (clopidogrel), heparin, statin, early invasive strategy (PCI).

- **STEMI:**
 - ECG Findings: ST elevation (>1mm in 2+ contiguous leads), reciprocal ST depression.
 - Treatment: Reperfusion ASAP → PCI (preferred) or fibrinolytics (tPA if PCI >90 min away).
 - Complications:
 - ✦ Ventricular arrhythmias (VF/VT) → defibrillation.
 - ✦ Cardiogenic shock (↓BP, pulmonary edema) → inotropes (dobutamine), IABP.
 - ✦ Papillary muscle rupture → acute mitral regurgitation (holosystolic murmur).

2. Heart Failure (HF)

- **Systolic HF (HFrEF, EF <40%):**
 - Causes: Ischemic cardiomyopathy, dilated cardiomyopathy (DCM).
 - Treatment: ACEI/ARB + beta-blocker (carvedilol/metoprolol) + spironolactone + SGLT2 inhibitors.
- **Diastolic HF (HFpEF, EF ≥50%):**
 - Causes: HTN, hypertrophic cardiomyopathy (HCM), amyloidosis.
 - Treatment: Diuretics (symptom relief), BP control.
- **Acute Decompensated HF:**
 - Symptoms: Dyspnea, crackles, S3 gallop, JVD, peripheral edema.
 - Treatment: Diuretics (furosemide), vasodilators (nitroprusside/nitroglycerin), inotropes (dobutamine if hypotensive).

3. Valvular Heart Disease

| V al ve | Stenosis | Regurgitation |
|---------------|----------|---------------|
| | | |

| | | |
|------------------------------|--|---|
| A or ti c | Systolic ejection murmur (SEM), syncope, angina, S4 | Early diastolic decrescendo murmur, wide pulse pressure, bounding pulses |
| M itr al | Diastolic rumble, opening snap, LA enlargement (afib) | Holosystolic murmur at apex, radiating to axilla |

- **Aortic Stenosis: Triad → Syncope, angina, dyspnea.**
- **Mitral Regurgitation: Acute (papillary muscle rupture) → pulmonary edema.**
- **Mitral Valve Prolapse: Mid-systolic click + late systolic murmur, anxiety, tall/thin body habitus.**

4. Arrhythmias

- **Atrial Fibrillation (A-fib):**
 - **Irregularly irregular pulse, no P waves.**
 - **Treatment:**
 - ✦ **Rate control** (beta-blockers, CCBs, digoxin).
 - ✦ **Rhythm control** (amiodarone, cardioversion if unstable). ✦
 - Anticoagulation (CHADS₂-VASc ≥2 → warfarin/DOACs).**
- **Ventricular Tachycardia (VT):**
 - **Wide QRS, no P waves.** ○ **Treatment: Unstable → cardioversion, stable → amiodarone/lidocaine.**

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Bradycardia:

- Sinus node dysfunction (sick sinus syndrome) → pacemaker.
- AV Blocks:
 - ✦ 1st-degree: PR >200ms.
 - ✦ 2nd-degree (Type I: Wenckebach): PR prolongation → dropped QRS.
 - ✦ 3rd-degree (Complete): P waves and QRS dissociated → pacemaker.

5. Hypertension (HTN)

- Essential (Primary) HTN (90%): No identifiable cause.
- Secondary HTN Causes:
 - Renal artery stenosis → ↑Renin, unilateral small kidney.
 - Pheochromocytoma → Episodic HTN, ↑catecholamines.
 - Cushing's → ↑Cortisol, moon facies.
- Hypertensive Emergency: BP >180/120 + end-organ damage (encephalopathy, renal failure, papilledema) → IV nitroprusside/labetalol.

6. Cardiomyopathies

| Type | Key Features | Treatment |
|---------------------------|--|---|
| Dilated (DCM) | ↓EF, S3, global hypokinesis | ACEI, beta-blockers |
| Hypertrophic (HCM) | LV hypertrophy, diastolic dysfunction, systolic murmur ↑ with Valsalva | Beta-blockers, avoid nitrates/diuretics |
| Restrictive (Amyloidosis) | ↑LV wall thickness, "sparkling" myocardium on echo | Supportive, poor prognosis |

7. Pericardial Disease

- Acute Pericarditis:
 - Chest pain improved by sitting forward, pericardial friction rub.
 - ECG: Diffuse ST elevation, PR depression.
 - Treatment: NSAIDs + colchicine.

- **Cardiac Tamponade:**
 - Beck's Triad: Hypotension, JVD, muffled heart sounds.
 - Pulsus paradoxus (>10 mmHg drop in BP with inspiration).
 - Treatment: Pericardiocentesis (emergency).

8. Congenital Heart Disease

| Defect | Shunt Direction | Key Features |
|---------------------|-----------------|--|
| ASD | L → R | Fixed split S2, pulmonary flow murmur |
| VSD | L → R | Holosystolic murmur at LSB |
| PDA | L → R | Continuous "machine-like" murmur |
| Tetralogy of Fallot | R → L | 4 features: VSD, RVH, overriding aorta, PS → "Cyanotic spells" |

9. High-Yield Pharmacology

- **Beta-Blockers:** ↓HR, ↓BP (avoid in asthma, decompensated HF).
- **CCBs:**
 - Dihydropyridines (amlodipine) → vasodilation.
 - Non-DHP (verapamil/diltiazem) → ↓HR, avoid in HF.
- **Digoxin:** ↑Contractility, ↓HR (toxicity → nausea, yellow vision, arrhythmias).
- **Nitrates:** Venodilation → ↓preload (contraindicated in RV infarction, HCM).

10. Key ECG Findings

- **STEMI:** ST elevation.
 - **Hyperkalemia:** Peaked T waves → widened QRS → sine wave → VF.
 - **Hypokalemia:** U waves, flat T waves.
- Long QT Syndrome: Risk of Torsades de pointes (treat with Mg²⁺).

Nephrology

1. Acid-Base Disorders

Metabolic Acidosis (pH <7.35, HCO₃⁻ <22)

- Anion Gap (AG) = $\text{Na}^+ - (\text{Cl}_- + \text{HCO}_3_-)$ ○ ↑AG (MUDPILES):
 - ✦ Methanol, Uremia, DKA, Paraldehyde, INH/Iron, Lactic acidosis, Ethylene glycol, Salicylates.
- Normal AG (Hyperchloremic):
 - ✦ Diarrhea, RTA (Type 1-4), acetazolamide, saline infusion.
- Treatment: Correct underlying cause (e.g., insulin for DKA, bicarb for severe acidosis).

Metabolic Alkalosis (pH >7.45, HCO₃⁻ >26)

- Causes:
 - Vomiting/NG suction (loss of H⁺) → hypochloremic, hypokalemic.
 - Hyperaldosteronism (↑H⁺ excretion).
- Treatment: NS for volume depletion, KCl for hypokalemia, acetazolamide if volume overloaded.

Respiratory Acidosis/Alkalosis

- Respiratory Acidosis (↑pCO₂): COPD, opioid overdose.
- Respiratory Alkalosis (↓pCO₂): Anxiety, PE, salicylate toxicity.

2. Electrolyte Disorders

Hyperkalemia (K⁺ >5.0)

- Causes: K⁺ supplements, ACEIs/ARBs, spironolactone, rhabdo, acidosis.
- ECG: Peaked T waves → widened QRS → sine wave → VF.
- Treatment:

- Stabilize myocardium: Calcium gluconate.
- Shift K^+ into cells: Insulin + glucose, albuterol, bicarb.
- Remove K^+ : Kayexalate, dialysis.

Hypokalemia ($K^+ < 3.5$)

- Causes: Diuretics, vomiting, hyperaldosteronism.
- ECG: U waves, flat T waves, arrhythmias.
- Treatment: Oral/KCl IV (if severe).

Hypernatremia ($Na^+ > 145$) → Water loss (diabetes insipidus, dehydration).

Hyponatremia ($Na^+ < 135$) → SIADH, heart failure, cirrhosis.

3. Acute Kidney Injury (AKI)

Prerenal (↓Renal perfusion)

- Causes: Hypovolemia, HF, NSAIDs, renal artery stenosis.
- Labs: BUN:Cr > 20 , FENa $< 1\%$, urine osmolality > 500 .
- Treatment: Fluids, correct underlying cause.

Intrinsic Renal

- Acute Tubular Necrosis (ATN):
 - Causes: Ischemia (prolonged hypotension), nephrotoxins (aminoglycosides, contrast).
 - Labs: Muddy brown casts, FENa $> 2\%$.
- Glomerulonephritis: Hematuria, proteinuria, RBC casts.
- Interstitial Nephritis: Fever, rash, eosinophilia, WBC casts (drugs: PCN, NSAIDs).

Postrenal (Obstructive)

- Causes: BPH, stones, cervical cancer.
- Diagnosis: Hydronephrosis on ultrasound.
- Treatment: Foley catheter, nephrostomy.

4. Chronic Kidney Disease (CKD)

- Stages: Based on GFR (Stage 5 = ESRD, GFR <15).
- Complications:
 - Anemia: ↓EPO → treat with erythropoietin.
 - Renal osteodystrophy: ↑PTH → osteitis fibrosa cystica (treat with vitamin D, phosphate binders).
 - Metabolic acidosis: Bicarb supplementation.
- Indications for dialysis: Uremia, hyperkalemia, acidosis, fluid overload.

5. Glomerular Diseases

Nephrotic Syndrome (Proteinuria >3.5g/day, hypoalbuminemia, edema, hyperlipidemia)

- Minimal Change Disease: Most common in kids, responds to steroids.
- Focal Segmental Glomerulosclerosis (FSGS): HIV, obesity, heroin use.
- Membranous Nephropathy: Anti-PLA2R antibodies, associated with HBV, malignancy.

Nephritic Syndrome (Hematuria, proteinuria <3.5g, HTN, oliguria)

- Post-Strep GN: 2 weeks after strep throat, subepithelial humps on EM.
- IgA Nephropathy: Hematuria after URI, mesangial IgA deposits.
- Rapidly Progressive GN (RPGN): Crescents on biopsy (Goodpasture's, ANCA vasculitis).

6. Tubular Disorders

- Fanconi Syndrome: Proximal RTA + glycosuria, phosphaturia, aminoaciduria.
- RTA Types:
 - Type 1 (Distal): Hypokalemia, urine pH >5.5 (stones, Sjögren's).
 - Type 2 (Proximal): Hypokalemia, urine pH <5.5 (Fanconi, multiple myeloma).
 - Type 4 (Hypoaldosteronism): Hyperkalemia (DM, ACEIs, spironolactone).

7. Hypertension & Renal Artery Stenosis

- Renovascular HTN: Unilateral small kidney, ↑renin, bruit.
- Diagnosis: Renal artery Doppler, captopril renography.
- Treatment: Revascularization (stenting) or ACEI if bilateral.

8. Dialysis Complications

- **Disequilibrium Syndrome:** Headache, seizures (rapid solute shifts).
- **Access Issues:** AV fistula (best), graft, catheter (highest infection risk).

9. High-Yield Pharmacology

- **Loop Diuretics (Furosemide):** Acts at ascending loop, causes hypokalemia, ototoxicity.
- **Thiazides (HCTZ):** Acts at DCT, causes hypercalcemia, hypokalemia.
- **Spironolactone:** K⁺-sparing (blocks aldosterone), used in ascites.

10. Key Formulas

- **FENa (%)** = $(\text{Urine Na} \times \text{Plasma Cr}) / (\text{Plasma Na} \times \text{Urine Cr}) \times 100$ ○ **<1% = Prerenal, >2% = ATN.**
- **Anion Gap** = $\text{Na}_+ - (\text{Cl}_- + \text{HCO}_3_-)$ (**Normal = 8-12**).

Here are some **high-yield rheumatology facts** for the **USMLE**:

1. Rheumatoid Arthritis (RA)

- **Autoantibodies:** RF (IgM) and anti-CCP (more specific).
- **Pathology:** Synovial hyperplasia → pannus formation → joint destruction.
- **Extra-articular:** Rheumatoid nodules, interstitial lung disease (ILD), Felty's syndrome (RA + splenomegaly + neutropenia), Sjögren's syndrome (secondary).
- **X-ray:** Juxta-articular osteopenia, erosions, joint space narrowing.
- **Treatment:** DMARDs (methotrexate 1st line), TNF- α inhibitors (if refractory).

2. Systemic Lupus Erythematosus (SLE)

- **Diagnosis:** ANA (sensitive but not specific), anti-dsDNA (specific, correlates with nephritis), anti-Smith (highly specific).
- **Clinical:** Malar rash, discoid rash, photosensitivity, arthritis, serositis (pleuritis/pericarditis), renal disease (lupus nephritis), neuropsychiatric symptoms.
- **Drug-induced lupus:** Hydralazine, procainamide, isoniazid → anti-histone antibodies.

3. Seronegative Spondyloarthropathies (HLA-B27 associated)

- **Ankylosing spondylitis:** Sacroiliitis (X-ray: bamboo spine), uveitis, aortic regurgitation.
- **Reactive arthritis:** Triad (urethritis, conjunctivitis, arthritis) – "Can't see, can't pee, can't climb a tree".
- **Psoriatic arthritis:** DIP joint involvement, nail pitting, "sausage digits" (dactylitis).
- **Enteropathic arthritis:** Associated with IBD (Crohn's/UC).

4. Gout vs. Pseudogout

- **Gout:** Monosodium urate crystals (negatively birefringent, needle-shaped).
 - Risk factors: Male, alcohol, diuretics, high-purine diet.
 - Treatment: Acute – NSAIDs/colchicine/steroids; Chronic – allopurinol/febuxostat (↓ uric acid).
- **Pseudogout:** Calcium pyrophosphate (CPP) crystals (weakly positively birefringent, rhomboid).
 - Associated with: Hemochromatosis, hyperparathyroidism, hypomagnesemia.

5. Sjögren's Syndrome

- **Autoantibodies:** Anti-Ro (SS-A) and Anti-La (SS-B).
- **Clinical:** Dry eyes (keratoconjunctivitis sicca), dry mouth (xerostomia), parotid enlargement, lymphoma risk.

6. Systemic Sclerosis (Scleroderma)

- **Limited (CREST syndrome):**
 - Calcinosis, Raynaud's, Esophageal dysmotility, Sclerodactyly, Telangiectasia.
 - Autoantibody: Anti-centromere.
- **Diffuse:** Pulmonary fibrosis, renal crisis (malignant HTN + ↑ renin).
 - Autoantibody: Anti-Scl-70 (anti-topoisomerase).

7. Polymyositis (PM) & Dermatomyositis (DM)

- **Autoantibodies:** Anti-Jo-1 (PM, associated with interstitial lung disease).
- **Clinical:** Proximal muscle weakness, elevated CK.
- **DM-specific:** Heliotrope rash, Gottron's papules.
- **Associated with malignancy** (especially DM).

8. Vasculitides

- **Giant Cell (Temporal) Arteritis:**
 - Symptoms: Headache, jaw claudication, vision loss (emergency – give steroids!).
 - Diagnosis: ESR/CRP ↑, temporal artery biopsy.
- **Takayasu's arteritis:** "Pulseless disease", aortic arch involvement (young women).
- **Granulomatosis with Polyangiitis (GPA, Wegener's):**
 - c-ANCA (anti-PR3). ○ Triad: Necrotizing granulomas (lungs, sinuses), glomerulonephritis.
- **Microscopic Polyangiitis (MPA):** p-ANCA (anti-MPO), no granulomas.
- **Eosinophilic Granulomatosis with Polyangiitis (EGPA, Churg-Strauss):** Asthma, eosinophilia, p-ANCA.

9. Osteoarthritis (OA) vs. Rheumatoid Arthritis (RA)

| Feature | OA | RA |
|---------|----|----|
|---------|----|----|

| | | |
|---------------------|--|--|
| Joints | DIP, PIP, knees, hips | MCP, PIP, wrists |
| Symmetry | Asymmetric early | Symmetric |
| X-ray | Osteophytes , joint space narrowing | Erosions , juxta-articular osteopenia |
| Inflammation | Minimal | Synovitis, pannus |

10. Miscellaneous

- **Polymyalgia Rheumatica**: Proximal muscle pain/stiffness, ↑ ESR, responds to steroids (often coexists with **giant cell arteritis**).
- **Behçet's Disease**: Oral/genital ulcers, uveitis, pathergy.
- **Lyme Disease**: Erythema migrans, knee arthritis, facial palsy (CN VII).

Key Mnemonics:

- **SLE criteria (SOAP BRAIN MD)** – Serositis, Oral ulcers, Arthritis, Photosensitivity, Blood disorders, Renal, ANA, Immunologic, Neurologic, Malar rash, Discoid rash.
- **CREST syndrome** – Calcinosis, Raynaud's, Esophageal dysmotility, Sclerodactyly, Telangiectasia.

RESPIRATORY

1. Obstructive vs. Restrictive Lung Disease

| Feature | Obstructive (\downarrow FEV ₁ /FVC) | Restrictive (\downarrow TLC, normal/increased FEV ₁ /FVC) |
|------------|---|---|
| Examples | COPD, Asthma, Bronchiectasis | ILD, Sarcoidosis, Kyphoscoliosis, Obesity |
| Spirometry | FEV ₁ /FVC < 0.7 | FEV ₁ /FVC \geq 0.7, \downarrow TLC |
| Causes | Airway obstruction | Reduced lung expansion (fibrosis, chest wall) |

2. Chronic Obstructive Pulmonary Disease (COPD)

- **Types:**
 - **Chronic bronchitis** ("Blue bloater") – productive cough, hypoxemia, cor pulmonale.
 - **Emphysema** ("Pink puffer") – dyspnea, barrel chest, \downarrow DLCO, α -1 antitrypsin deficiency (panacinar emphysema in young non-smokers).
- **Pathology:** Destruction of alveoli (emphysema) or mucus hypersecretion (bronchitis).
- **Diagnosis:** Post-bronchodilator FEV₁/FVC < 0.7.
- **Treatment:** Smoking cessation, SABA/LAMA (bronchodilators), oxygen if hypoxemic.

3. Asthma

- **Triad:** Wheezing, dyspnea, cough (worse at night).
- **Pathology:** Reversible airway obstruction, eosinophilic inflammation.
- **Diagnosis:** \uparrow FEV₁ after bronchodilator (\geq 12%), \downarrow FEV₁/FVC.
- **Severe attack:** Silent chest, PaCO₂ > 40 mmHg (ominous sign of respiratory fatigue).
- **Treatment:** SABA (albuterol), ICS, leukotriene inhibitors (montelukast).

4. Pulmonary Embolism (PE)

- **Wells Criteria** (estimates probability):
 - Clinical signs of DVT, HR > 100, recent immobilization/surgery, hemoptysis, malignancy.
- **Diagnosis:** CT angiography (gold standard), D-dimer (if low probability).

- ECG: S1Q3T3, right heart strain (RBBB, RAD, T-wave inversions V1-V4).
- Treatment: Anticoagulation (heparin → DOACs/warfarin).

5. Pneumonia

| Type | Key Features | Causative Organisms |
|-----------------|---------------------------------------|---|
| Community (CAP) | Fever, cough, crackles | <i>S. pneumoniae</i> (most common), <i>H. influenzae</i> , <i>Mycoplasma</i> (atypical) |
| Hospital (HAP) | >48h after admission | <i>Pseudomonas</i> , MRSA, <i>Klebsiella</i> |
| Aspiration | Right lower lobe, foulsmelling sputum | Anaerobes (<i>Bacteroides</i> , <i>Peptostreptococcus</i>) |
| TB | Night sweats, weight loss, +AFB stain | <i>Mycobacterium tuberculosis</i> |

- **Diagnosis:** CXR, sputum culture, procalcitonin (bacterial vs. viral).
- **Treatment:** CAP – Ceftriaxone + azithromycin; HAP – Piperacillin/tazobactam/vancomycin.

6. Interstitial Lung Disease (ILD)

- **Causes:** Pneumoconioses (asbestosis, silicosis), drugs (amiodarone, bleomycin), sarcoidosis, idiopathic pulmonary fibrosis (IPF).
- **Findings:** Bibasilar crackles, restrictive pattern, honeycombing on CT.
- **Diagnosis:** HRCT, lung biopsy.

7. Lung Cancer

- **Non-small cell (NSCLC) (80%):**
 - Adenocarcinoma (peripheral, non-smokers, EGFR mutations).
 - Squamous cell (central, smoking, PTHrP → hypercalcemia).
- **Small cell (SCLC) (20%):** Central, smoking, paraneoplastic syndromes (SIADH, Lambert-Eaton).
- **Diagnosis:** CT-guided biopsy, PET scan for staging.

8. Pleural Diseases

- **Pleural effusion:**
 - **Transudate** (↑ **hydrostatic pressure** – CHF, nephrotic syndrome).
 - **Exudate** (↑ **permeability** – pneumonia, malignancy, TB) – **Light's criteria**.
- **Pneumothorax:** ○ **Primary** (tall, thin males, **ruptured blebs**). ○ **Secondary** (COPD, trauma).
 - **Tension pneumo** (tracheal deviation, **hypotension**, **absent breath sounds**).

9. Sleep Apnea

- **Obstructive (OSA):** Daytime sleepiness, snoring, obesity, hypertension.
- **Diagnosis:** Polysomnography (PSG).
- **Treatment:** CPAP, weight loss.

10. High-Altitude Pulmonary Edema (HAPE)

- **Symptoms:** Dyspnea, cough, pink frothy sputum.
- **Pathophysiology:** Hypoxia → pulmonary vasoconstriction → edema.
- **Treatment:** Descent, oxygen, nifedipine.

Key Mnemonics:

- **COPD exacerbation treatment:** Steroids, Oxygen, Bronchodilators, Antibiotics (if infective).
- **Asthma drugs (quick relief vs. maintenance):** SABA (rescue), ICS (prevention).
- **Pneumonia bugs:** CAP = *S. pneumo*, HAP = *Pseudomonas/MRSA*, **Atypical** = *Mycoplasma/Chlamydia*

Final Tip: Focus on clinical correlations (e.g., nerve injuries, hernias, fractures) and vascular supply patterns for exams!

Source: Dr. Maurych's *Anatomy Shelf Notes*.

High-yield physiology concepts from Guyton & Hall that are essential for USMLE/NRE:

1. Cardiovascular Physiology

- **Frank-Starling Law:** \uparrow Preload \rightarrow \uparrow Stroke volume (up to a point)
- **Cardiac Output (CO) = HR \times SV** \circ SV depends on **preload, afterload, contractility**
- **Mean Arterial Pressure (MAP) = CO \times TPR** \circ Baroreceptor reflex (carotid/aortic arch) adjusts HR and TPR
- **Vascular Resistance:**
 - \circ **Poiseuille's Law:** Resistance $\propto 1/\text{radius}^4$ (most important regulator of blood flow)
- **Coronary Blood Flow:**
 - \circ Occurs mainly during **diastole** (LV compression blocks flow in systole)

2. Renal Physiology

- **GFR = Kf \times (PGC – PBS – π GC)** \circ **Autoregulation:** Myogenic + Tubuloglomerular feedback (macula densa)
- **Na⁺ Reabsorption:**
 - \circ **PCT (67%)** – Na⁺/H⁺ exchanger, **Loop of Henle (25%)** – NKCC2, **DCT (5%)** – Na⁺/Cl⁻ cotransporter
- **Countercurrent Mechanism:**
 - \circ **Descending limb:** Water reabsorption (via aquaporins) \circ **Ascending limb:** Na⁺/K⁺/Cl⁻ reabsorption (dilutes urine)
- **ADH (Vasopressin):** \uparrow Water reabsorption in **collecting duct** (via aquaporin-2)
- **Aldosterone:** \uparrow Na⁺ reabsorption & K⁺ secretion in **DCT/CD**

3. Respiratory Physiology

- **Alveolar Gas Equation:** $\text{PAO}_2 = \text{FiO}_2(\text{P}_{\text{ATM}} - \text{P}_{\text{H}_2\text{O}}) - (\text{PaCO}_2/R)$ \circ **A-a Gradient = PAO₂ – PaO₂** (\uparrow in V/Q mismatch, diffusion defects, R \rightarrow L shunt)
- **Oxygen-Hemoglobin Dissociation Curve:**
 - \circ **Right shift (\downarrow affinity):** \uparrow CO₂, \uparrow H⁺, \uparrow 2,3-BPG, \uparrow Temp (e.g., exercise) \circ **Left shift (\uparrow affinity):** \downarrow CO₂, \downarrow H⁺, \downarrow 2,3-BPG, \downarrow Temp (e.g., fetal Hb)
- **Ventilation-Perfusion (V/Q) Mismatch:** \circ **Dead space (V/Q = ∞):** Pulmonary embolism \circ **Shunt (V/Q = 0):** Atelectasis, pneumonia

4. Acid-Base Balance

- **Henderson-Hasselbalch Equation:** $\text{pH} = 6.1 + \log\left(\frac{[\text{HCO}_3^-]}{(0.03 \times \text{PCO}_2)}\right)$
- **Metabolic Acidosis:** $\downarrow \text{HCO}_3^-$ (e.g., DKA, diarrhea) $\rightarrow \uparrow$ **Anion Gap (MUDPILES)** • **Respiratory Acidosis:** $\uparrow \text{PCO}_2$ (e.g., COPD, opioid OD) • **Renal Compensation:**
 - **Proximal tubule:** Reabsorbs HCO_3^-
 - **Collecting duct:** Secretes H^+ (via H^+ -ATPase)

5. Neurophysiology

- **Action Potential:**
 - **Depolarization:** Na^+ influx (fast channels)
 - **Repolarization:** K^+ efflux (slow channels)
 - **Refractory Periods:** Absolute (Na^+ inactivation) vs. Relative (K^+ efflux)
- **Synaptic Transmission:**
 - **EPSP** ($\text{Na}^+/\text{Ca}^{2+}$ influx) vs. **IPSP** (Cl^- influx/ K^+ efflux)
 - **NMJ:** ACh \rightarrow Nicotinic receptors $\rightarrow \text{Na}^+$ influx \rightarrow Muscle contraction

6. Endocrine Physiology

- **Hypothalamic-Pituitary Axis:**
 - **TRH** \rightarrow **TSH** \rightarrow **T3/T4** (\uparrow BMR, \uparrow β -receptors)
 - **CRH** \rightarrow **ACTH** \rightarrow **Cortisol** (\uparrow gluconeogenesis, immunosuppression)
- **Insulin vs. Glucagon:**
 - **Insulin** (β -cells): \uparrow Glucose uptake (GLUT4), \downarrow Lipolysis
 - **Glucagon** (α -cells): \uparrow Glycogenolysis, \uparrow Gluconeogenesis

7. GI Physiology

- **Gastric Acid Secretion:**
 - **Parietal cells:** H^+/K^+ ATPase (stimulated by **ACh, gastrin, histamine**)
 - **Cephalic phase:** Vagal stimulation (ACh)
- **Bile:** Emulsifies fats (bile salts), excretes bilirubin (no digestion)
- **Absorption Sites:**

- **Iron/Calcium:** Duodenum
- **B12/BILE SALTS:** Ileum

8. Hematology

- **Hemoglobin:**
 - **O₂ binding:** Cooperative binding (sigmoidal curve) ○ **CO Poisoning:** ↑ COHb → Left shift (↓ O₂ delivery)
- **Clotting Cascade:**
 - **Extrinsic Pathway:** Tissue factor (Factor VIIa) ○ **Intrinsic Pathway:** XII → XI → IX → X

9. Autonomic Nervous System

- **Sympathetic (Fight/Flight):**
 - **α₁:** Vasoconstriction (↑ BP) ○ **β₁:** ↑ HR, ↑ Contractility
- **Parasympathetic (Rest/Digest):**
 - **M3:** ↑ Secretions, ↓ HR (vagal tone)

10. Special Senses

- **Vision:**
 - **Rods:** Night vision (rhodopsin) ○ **Cones:** Color vision (S/M/L opsins)
- **Hearing:**
 - **Organ of Corti:** Hair cells (stereocilia bend → K⁺ influx)

Key Mnemonics for USMLE

- **Anion Gap Metabolic Acidosis: MUDPILES** (Methanol, Uremia, DKA, Paraldehyde, INH, Lactic acidosis, Ethylene glycol, Salicylates)
- **Cushing's Triad:** ↑ BP, ↓ HR, Irregular RR (sign of ↑ ICP)
- **Left Shift (O₂-Hb Curve): CADET face right** (CO, Acidosis, 2,3-DPG, Exercise, Temperature)

Final Tips

- **Master these equations:** Nernst, Fick's Law, Henderson-Hasselbalch.
- **Focus on clinical correlations:** e.g., V/Q mismatch (PE vs. pneumonia), acidbase disorders, autonomic drug effects.

High-Yield Biochemistry Points from *Lippincott Illustrated Reviews* (USMLE Focus)

1. Enzyme Kinetics & Regulation

- **Michaelis-Menten Equation:**
 - $V_o = (V_{max} \times [S]) / (K_m + [S])$ ○ K_m = Substrate concentration at $\frac{1}{2}V_{max}$ ($\downarrow K_m = \uparrow$ affinity).
- **Inhibitors:**
 - **Competitive:** $\uparrow K_m$ (e.g., statins for HMG-CoA reductase). ○ **Noncompetitive:** $\downarrow V_{max}$ (e.g., cyanide for cytochrome oxidase).
 - **Uncompetitive:** \downarrow both K_m and V_{max} .
- **Allosteric Regulation:** ○ **Feedback inhibition** (e.g., CTP inhibits aspartate transcarbamoylase).

2. Carbohydrate Metabolism

- **Glycolysis:**
 - **Rate-limiting enzyme: Phosphofructokinase-1 (PFK-1)** (activated by AMP/F2,6BP; inhibited by ATP/citrate).
 - **ATP Yield:** 2 ATP (anaerobic), 30-32 ATP (aerobic).
- **Gluconeogenesis:**
 - **Key enzymes:** Pyruvate carboxylase, PEP carboxykinase, F1,6bisphosphatase, G6Pase.
 - **Fed state:** Insulin \uparrow glycolysis, \downarrow gluconeogenesis.
- **TCA Cycle:**
 - **Rate-limiting enzyme: Isocitrate dehydrogenase** ($NAD^+ \rightarrow NADH$). ○ **ATP Yield:** 3 NADH, 1 FADH₂, 1 GTP per cycle.

3. Lipid Metabolism

- **Fatty Acid Oxidation:**
 - **β -Oxidation:** Occurs in mitochondria; **Carnitine shuttle** transports FA.
 - **Deficiency:** MCAD deficiency \rightarrow hypoglycemia, \uparrow dicarboxylic acids.
- **Ketogenesis:**
 - **Liver mitochondria** (starvation/DKA); **HMG-CoA synthase** is key.
- **Cholesterol Synthesis:**
 - **HMG-CoA reductase** (rate-limiting; inhibited by statins).

4. Nitrogen Metabolism

- **Urea Cycle:**
 - **Location:** Liver (mitochondria + cytoplasm).
 - **Rate-limiting enzyme:** **Carbamoyl phosphate synthetase I** (requires Nacetylglutamate).
 - **Deficiency:** Ornithine transcarbamylase (OTC) \rightarrow \uparrow ammonia, \uparrow orotic acid (X-linked).
- **Amino Acid Catabolism:**
 - **Branched-chain AAs (Leu, Ile, Val):** Defects cause **maple syrup urine disease**.
 - **Phenylalanine:** PKU \rightarrow \uparrow phenylalanine, \downarrow tyrosine (treated with low-Phe diet).

5. Vitamins & Cofactors

- **B1 (Thiamine):**
 - **Deficiency:** **Beriberi** (wet/dry), **Wernicke-Korsakoff**.
 - **Enzymes:** PDH, α -KGDH, transketolase.
- **B12 (Cobalamin):**
 - **Deficiency:** **Megaloblastic anemia, neurological defects** (\downarrow methionine synthase).
- **Folate:**
 - **Deficiency:** **Neural tube defects, megaloblastic anemia** (\downarrow dTMP synthesis).

6. Molecular Biology

- **DNA Replication:**
 - **Leading strand:** Continuous ($5' \rightarrow 3'$).
 - **Lagging strand:** Okazaki fragments (RNA primer needed).
- **Mutations:**
 - **Missense:** Single AA change (e.g., sickle cell \rightarrow Glu \rightarrow Val).
 - **Nonsense:** Premature stop codon (e.g., Duchenne muscular dystrophy).

7. Glycogen Storage Diseases

| Disease | Deficient Enzyme | Key Feature |
|------------|-------------------------------------|-------------------------------------|
| Von Gierke | G6Pase | Hepatomegaly, hypoglycemia |
| McArdle | Muscle glycogen phosphorylase | Exercise intolerance, myoglobinuria |
| Pompe | Lysosomal α -1,4-glucosidase | Cardiomegaly, infantile death |

8. Metabolic Pathways Integration

- **Fed State:** Insulin \uparrow glycolysis, FA synthesis, glycogenesis.
- **Fasting State:** Glucagon \uparrow gluconeogenesis, glycogenolysis, ketogenesis.

9. Clinical Correlations

- **G6PD Deficiency:** Hemolytic anemia with oxidative stress (favism, sulfa drugs).
- **Lesch-Nyhan Syndrome:** HGPRT deficiency \rightarrow \uparrow uric acid, self-mutilation.
- **Alkaptonuria:** Homogentisate oxidase deficiency \rightarrow black urine, ochronosis.

10. High-Yield Mnemonics

- **Rate-limiting enzymes:**
 - **Glycolysis:** PFK-1 (People Fear Keto).
 - **TCA:** Isocitrate DH (I Like TCA).
- **Urea Cycle Defects:** OTC (Ornithine = Only Treatable with Carbs).

Final Tips for USMLE

- **Focus on diseases** (e.g., glycogen storage, vitamin deficiencies).
- **Master rate-limiting enzymes** and their regulators.
- **Link pathways to clinical scenarios** (e.g., DKA \rightarrow ketogenesis, PKU \rightarrow tyrosine deficiency).

High-Yield General Pathology Points from *Robbins Pathology* (USMLE Focus)

1. Cellular Adaptations & Injury

- **Atrophy:** ↓ Cell size (e.g., disuse atrophy, denervation).
- **Hypertrophy:** ↑ Cell size (e.g., cardiac muscle in hypertension).
- **Hyperplasia:** ↑ Cell number (e.g., endometrial hyperplasia, BPH).
- **Metaplasia:** Replacement with another cell type (e.g., Barrett's esophagus, squamous metaplasia in smokers).
- **Reversible Injury:** Cellular swelling, fatty change.
- **Irreversible Injury: Necrosis** (coagulative, liquefactive, caseous, fat, fibrinoid) vs. **Apoptosis** (programmed cell death).

2. Inflammation & Repair

- **Acute Inflammation:**
 - **Cardinal signs:** Rubor (redness), tumor (swelling), calor (heat), dolor (pain), functio laesa (loss of function).
 - **Mediators:** Histamine (mast cells), prostaglandins (COX pathway), bradykinin (pain).
 - **Outcomes:** Resolution, abscess, fibrosis, chronic inflammation.
- **Chronic Inflammation:**
 - **Cells:** Macrophages, lymphocytes, plasma cells.
 - **Granuloma:** Epithelioid macrophages + giant cells (e.g., TB, sarcoidosis).
- **Wound Healing:**
 - **Primary intention:** Clean surgical incision.
 - **Secondary intention:** Large wound (e.g., ulcer).

3. Hemodynamic Disorders

- **Edema:** ↑ Hydrostatic pressure (e.g., CHF) or ↓ oncotic pressure (e.g., nephrotic syndrome).
- **Thrombosis: Virchow's triad** (endothelial injury, stasis, hypercoagulability).
- **Embolism:**
 - **Pulmonary embolism:** DVT → right heart → lungs.
 - **Paradoxical embolism:** DVT → ASD/VSD → systemic circulation.
- **Infarction:**
 - **Pale infarct:** Arterial occlusion (e.g., kidney, heart).
 - **Hemorrhagic infarct:** Venous occlusion or dual blood supply (e.g., lung, liver).

4. Neoplasia

- **Benign vs. Malignant:**
 - **Benign:** Well-differentiated, slow growth, no metastasis.
 - **Malignant:** Poorly differentiated, invasion/metastasis.
- **Carcinogenesis:**
 - **Oncogenes:** *RAS* (most common), *MYC*, *HER2/neu*.
 - **Tumor suppressors:** *p53* ("guardian of genome"), *RB*, *APC*.
- **Paraneoplastic Syndromes:**
 - **Small cell lung cancer:** ACTH (Cushing's), SIADH.
 - **Squamous cell carcinoma:** PTHrP (hypercalcemia).

5. Genetic Disorders

- **Autosomal Dominant:**
 - **Huntington's disease:** CAG repeats → chorea, dementia.
 - **Familial adenomatous polyposis (FAP):** *APC* mutation → colon polyps.
- **Autosomal Recessive:**
 - **Cystic fibrosis:** $\Delta F508$ mutation in *CFTR* → \uparrow Cl^- in sweat, lung/pancreas disease.
 - **Phenylketonuria (PKU):** Phenylalanine hydroxylase deficiency.
- **X-Linked:**
 - **Duchenne muscular dystrophy:** Dystrophin deletion → \uparrow CK, Gower's sign.

6. Immunopathology

- **Hypersensitivity Reactions:**
 - **Type I (IgE):** Anaphylaxis, asthma.
 - **Type II (IgG/IgM):** AIHA, Goodpasture's (anti-GBM).
 - **Type III (Immune complexes):** SLE, post-streptococcal GN.
 - **Type IV (T-cell):** TB granuloma, contact dermatitis.
- **Autoimmune Diseases:**
 - **SLE:** Anti-dsDNA, anti-Smith, butterfly rash.
 - **Rheumatoid arthritis:** Anti-CCP, synovial pannus.

7. Infectious Disease Pathology

- **Bacterial:**
 - **Staph. aureus:** Abscesses (coagulase +), toxic shock syndrome (TSST-1).
 - **Strep. pyogenes:** Rheumatic fever (M protein), post-streptococcal GN.
- **Viral:**
 - **HIV:** ↓ CD4⁺ T cells → opportunistic infections (PCP, CMV, TB).
 - **HPV:** Squamous cell carcinoma (types 16/18).

8. Environmental & Nutritional Pathology

- **Smoking:** Squamous metaplasia → lung cancer, emphysema (α1-antitrypsin deficiency).
- **Alcohol:** Fatty liver → cirrhosis, Wernicke-Korsakoff (B1 deficiency).
- **Vitamin Deficiencies:**
 - **B1 (Thiamine):** Wet/dry beriberi, Wernicke-Korsakoff.
 - **B12:** Megaloblastic anemia, subacute combined degeneration.

9. High-Yield Mnemonics

- **Necrosis Types:** CLF (Coagulative, Liquefactive, Fat).
- **Tumor Suppressors:** p53, RB, APC ("PRAy they don't mutate").
- **Granulomatous Diseases:** TB, Sarcoidosis, Cat-scratch, Histoplasmosis (TSCH).

Final Tips for USMLE

- **Focus on mechanisms:** e.g., how p53 mutations cause Li-Fraumeni syndrome.
- **Link pathology to clinical findings:** e.g., caseous necrosis → TB.
- **Master high-yield images:** e.g., Reed-Sternberg cells (Hodgkin's lymphoma).

High-Yield Community Medicine Points for USMLE

1. Epidemiology & Biostatistics

- **Prevalence vs. Incidence:**
 - **Prevalence** = Total cases / Total population at a given time.
 - **Incidence** = New cases / Population at risk over a time period.
- **Study Types:**
 - **Randomized Controlled Trial (RCT)** = Gold standard for causation.
 - **Cohort Study** = Prospective, calculates **relative risk (RR)**.
 - **Case-Control Study** = Retrospective, calculates **odds ratio (OR)**.
- **Sensitivity & Specificity:**
 - **Sensitivity** = True positives / (True positives + False negatives).
 - **Specificity** = True negatives / (True negatives + False positives).

2. Screening Tests

- **Positive Predictive Value (PPV)** = True positives / (True positives + False positives).
- **Negative Predictive Value (NPV)** = True negatives / (True negatives + False negatives).
- **High Sensitivity Tests** = Best for **ruling out** disease (**SnOUT**).
- **High Specificity Tests** = Best for **ruling in** disease (**SpIN**).

3. Vaccination & Immunization

- **Live Attenuated Vaccines** (Contraindicated in pregnancy/immunocompromised):
 - MMR, Varicella, Yellow Fever, Rotavirus, Oral Polio (Sabin).
- **Inactivated/Killed Vaccines:**
 - Influenza, Hepatitis A, Rabies, Salk Polio.
- **Toxoid Vaccines:**
 - Tetanus, Diphtheria.

4. Infectious Disease Control

- **Quarantine** = Separates exposed but **asymptomatic** individuals.
- **Isolation** = Separates **symptomatic** infected individuals.
- **R0 (Basic Reproduction Number):**
 - **R0 > 1** = Epidemic likely.
 - **R0 < 1** = Outbreak will die out.

5. Occupational & Environmental Health

- **Lead Poisoning:**
 - **Symptoms:** Anemia, **wrist drop**, encephalopathy.

- **Treatment:** Chelation (EDTA, Succimer).
- **Asbestos Exposure:** ○ **Diseases:** Mesothelioma, lung cancer, asbestosis.

6. Maternal & Child Health

- **APGAR Score** (Assessed at 1 & 5 min): ○ **0-3** = Severe distress. ○ **4-6** = Moderate distress.
○ **7-10** = Normal.
- **Breastfeeding Benefits:** ○ **Colostrum** = Rich in IgA, protects against infections.

7. Nutrition & Deficiency Disorders

- **Vitamin A Deficiency:** ○ **Symptoms:** Night blindness, Bitot's spots, xerophthalmia.
- **Vitamin D Deficiency:** ○ **Children:** Rickets (bowing of legs). ○ **Adults:** Osteomalacia.

8. Preventive Medicine

- **Primary Prevention** = Prevents disease (e.g., vaccination).
- **Secondary Prevention** = Early detection (e.g., screening).
- **Tertiary Prevention** = Reduces complications (e.g., rehab).

9. High-Yield Mnemonics

- **Live Vaccines:** **MY VRR** (MMR, Varicella, Rotavirus, Rubella, Yellow Fever).
- **Notifiable Diseases:** **Mumps, Measles, Rabies, TB, Hepatitis A/B/C.**

Final Tips for USMLE

- **Focus on screening tests, vaccination schedules, and R0 calculations.**
- **Memorize key deficiency diseases and their treatments.**
- **Link epidemiology to public health interventions.**

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